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10/28/2005 16:35 FAX 16096312401

Duane Morris Princeton

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Application No. 09/582,049

REMARKS

1. Claims 1-4 and 7-12 are pending in the application. Of these claims, claims 1-4 and 7-10 stand rejected and claims 11 and 12 stand allowed. This reply amends claims 1, 2, 8 and 9.

2. Claims 1-4 and 7-8 stand rejected under 35 USC §103 as being unpatentable over U.S. Patent 5,182,091 to Yuge et al. (Yuge) in view of DE 29 24 584 (the '584 reference).

This rejection is traversed as Yuge in view of the '584 reference fail to arrive at the present invention. Specifically, Yuge in view of the '584 reference fail to teach or suggest "a cold crucible" as currently called for in claims 1-4 and 7-8.

With regard to this feature, the Examiner relies on Yuge for the teaching of a cold crucible:

In the references, there is no disclosure of preheating the crucible; therefore, it is reasonably assumed that the crucible is "cold", i.e., not preheated. ... Yuge '091 does disclose a container (i.e., crucible) lined with silica, however, there is disclosure of preheating the container before receiving the silicon. It should note that the instant claims do not exclude the presence of the inductive heating means (4) as shown in Figure 1 of Yuge '091 (note induction coil 12 in Figure 1 of the instant application).

It is respectfully submitted that the Examiner's reliance on Yuge for the teaching of a "cold crucible" is in error. Cold crucibles are well known in the art for "skull" melting of highly refractory materials by inductive heating the material in a manner that maintains the molten material in a shell of the material which is cool enough to act as a crucible. See, for example, U.S. Patent No. 4,049,384 entitled, COLD CRUCIBLE SYSTEM, which issued on September 20, 1977. The present application clearly describes this on page 5, lines 10-16:

The use of a cold inductive crucible has several purposes. First, this has the advantage of not contaminating the liquid, which is maintained in a skull, that is, a solid silicon skin (not shown) coats the inside of the crucible and contains the liquid silicon. Thus, the liquid silicon does not risk being contaminated by the material constitutive of walls 11 of the actual crucible, or of an intermediary wall as in know methods.

Cold crucibles typically include a wall that is cooled with a coolant, such as water. *Id.*, U.S. Patent No. 4,049,384.

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In contrast, Yuge discloses a quartz crucible 2 with a heat insulating lining 3. In fact, Yuges teaches away from a cold crucible because Yuge uses the heat insulating lining to retain the heat in the wall of the crucible, instead of a coolant to pull the heat away from the wall of the crucible to keep it cool, as is the case with a cold crucible. Thus, one of ordinary skill in the art would not consider the crucible taught by Yuges as the cold crucible claimed in the present invention.

Additionally, claim 1 now requires "causing the silicon melt from a bottom of the crucible to ascend along a central axis thereof to a free surface of the silicon melt, to turbulently stir the silicon melt." There is nothing in Yuge or the '584 reference which teaches or suggests this feature. Yuge in view of the '584 reference merely teach stirring of the molten silicon.

It should now be apparent that Yuge in view of the '584 reference clearly fail to teach or suggest the subject matter of claims 1-4 and 7-8. Accordingly, withdrawal of this rejection is respectfully urged.

3. Claims 9-10 stand rejected under 35 USC 103(a) as being unpatentable over Yuge in view of the '584 reference and U.S. Patent 4,048,436 to Hiratake et al. (Hiratake).

This rejection is traversed as Yuge in view of the '584 reference and Hiratake fail to arrive at the present invention. First, Yuge in view of the '584 reference and Hiratake fail to teach or suggest "a cold crucible...having a coil supplied by an A.C. voltage" as called for in claims 9-10. As discussed above, Yuge discloses a quartz crucible 2 with a heat insulating lining 3 that retains the heat in the wall of the crucible and, therefore, teaches away from the claimed cold crucible, which uses a coolant to pull the heat away from the wall of the crucible to keep it cool.

Second, claims 9 and 10 require "a removable magnetic yoke (3) between the plasma torch (2) and the crucible (1)." The Examiner relies upon Hiratake for the removable magnetic yoke. However, Hiratake does not disclose, teach or suggest that the rotating magnetic field generating means 44e is removable, as required in the claims 9 and 10. Hiratake also does not disclose, teach or suggest "inverting a stirring direction of the silicon load" as required by claims 9 and 10, because the rotating magnetic field generating means 44e of Hiratake is not removable.

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It should be apparent now that in view of the '584 reference and Hiratake clearly fail to teach or suggest the subject matter of claims 9 and 10. Accordingly, withdrawal of this rejection is respectfully urged.

4. Favorable reconsideration of this application is respectfully requested as it is believed that all outstanding issues have been addressed herein and, further, that claims 1-4 and 7-12 are in condition for allowance, early notification of which is earnestly solicited. Should there be any questions or matters whose resolution may be advanced by a telephone call, the examiner is cordially invited to contact applicants' undersigned attorney at his number listed below.

5. The Commissioner is hereby authorized to charge payment of any filing fees required under 37 CFR 1.16 and any patent application processing fees under 37 CFR 1.17, which are associated with this communication, or credit any overpayment to Deposit Account No. 50-2061.

Respectfully submitted,


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